

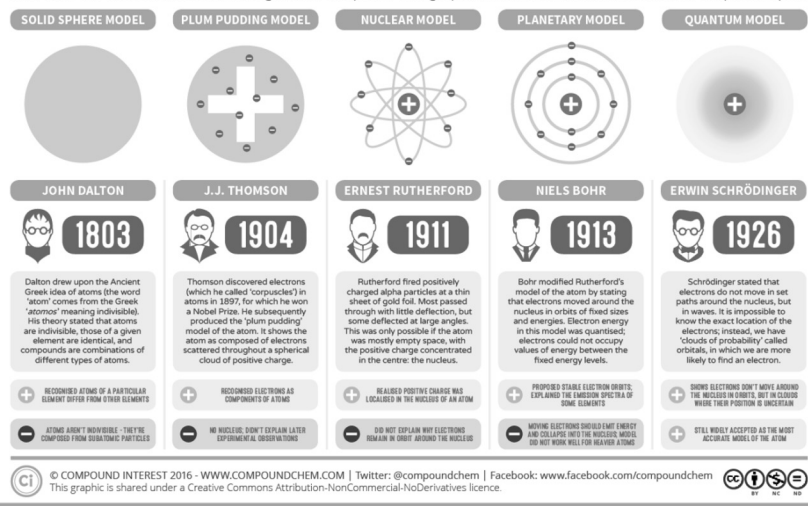
Studying Matter...

All materials on earth and the universe are made of matter. In this unit we will study the basic underpinning of matter...

The ATOM

A HISTORY OF THE ATOM: THEORIES AND MODELS

How have our ideas about atoms changed over the years? This graphic looks at atomic models and how they developed.



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From Matter to Atoms

Democritus Theory of Matter

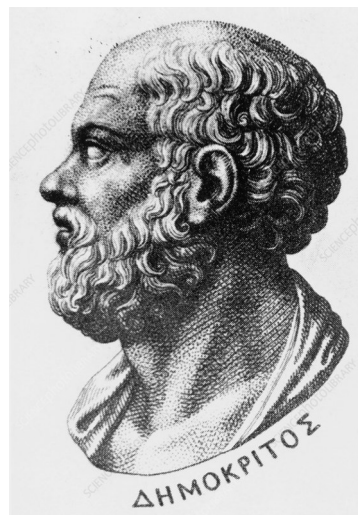
Democritus: Fifth Century BC (460 – 370BC)

If matter is divided into the smallest possible pieces you will eventually reach the smallest division of matter - "Atomos" – The atom



The Basic Elements

Prior to Democritus philosophers believed everything was made of Fire, Earth, Wind, Water, and Ether

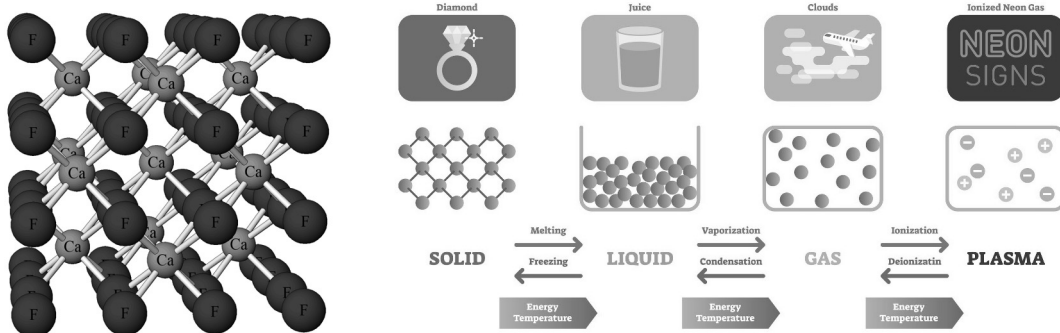


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From Matter to Atoms

Preliminary Atomic Theories

Democritus (400BC): The Atom Greeks (200BC): States of Matter



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From Matter to Atoms

Alchemy and The Chemical Reaction

Alchemy (1500s)

Alchemists believed gold could be **transmuted** (*changed*) from more common elements using fundamental characteristics of atomic theory.

A *chemical reaction* is a process in which atoms are changed (*rearranged*) to make new combination of atoms (*compounds and molecules*)

Alchemical Symbols

Three Principles



Sulfur Salt Mercury

The Four Elements



Fire Air Water Earth The Elements

Planets and Metals



Venus Jupiter Sun Mars Moon Mercury Saturn
Copper Tin Gold Iron Silver Quicksilver Lead

Alchemy defined the first elements / atomic symbols

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From Matter to Atoms

Preliminary Laws of Matter

Law of Conservation of Matter

Matter is neither created or destroyed just rearranged in new ways

Law of Conservation of Mass

The physical mass of matter is constant

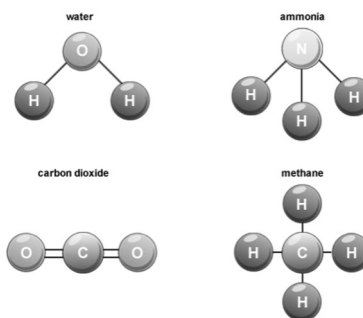
Law of Definite Composition (Proust's Law)

All combinations of atoms contain the same ratio (*by mass*) of all atoms that make up the matter

Compounds and Molecules

All combination of atoms are formed from existing atoms in definite proportions

Water is always 1 oxygen and 2 hydrogen [H_2O]



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From Matter to Atoms

Dalton's Four Principles of the Atom

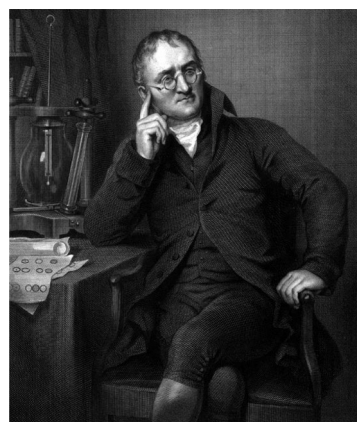
Matter and the atom is defined based on the basic principles of matter. His principles were:

First Principle of Atoms

All Matter is Made of Indivisible Atoms

Second Principle of Atoms

All Atoms of the same type have the same properties, including mass (*elements*)



John Dalton

English Chemist
1766 – 1844AD

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From Matter to Atoms

Dalton's Four Principles of the Atom

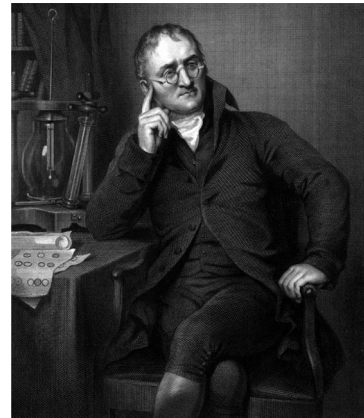
Dalton used the scientific method in this principles and was the first to write down the basic ideas in his principles of matter

Third Principle of Atoms

Compounds and Molecules are combinations of two or atoms combined together

Fourth Principle of Atoms

A *Chemical Reaction* occurs when atoms are rearranged forming new atom combinations



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